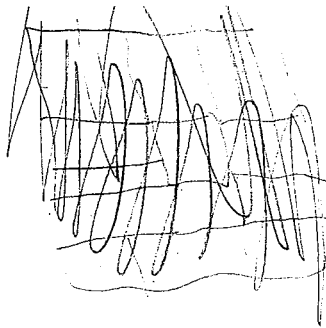


The following group of samples is for BREAKOUT #3 at Nottawasaga.

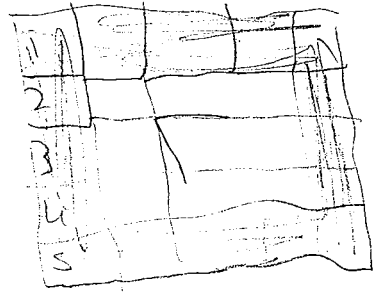
- to be used for ACTION activity
- each table of 4 will look at the 3 student samples (which are either all 3 correct, all 3 close or all 3 troublesome).
- the group will decide on feedback for each sample and general feedback for this 'group' of students for the following day
- each group of 4 will share their feedback with the 'whole group' using a document camera
- discussion will then move towards, "how do we help all of these diverse groups in our classroom" the next day?

The following
samples are:

Correct

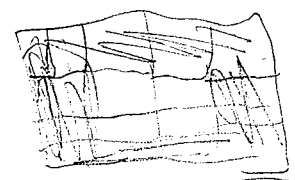


$$5 \times 5 = 16$$



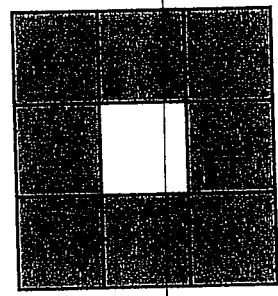
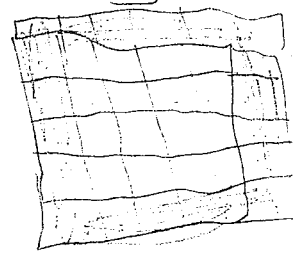
(2a) Perimeter Problem

$$4 \times 4 = 12$$



$$3 \times 3 = 8$$

$$6 \times 6 = 20$$



Rule

$$(n+1) \times 4$$

The rule is $n+1 \times 4$ because 1 represents 4 each grid

proof
$$\frac{n+1}{4} \times 4 = 17 \times 4 = 68$$

This is a 3x3 grid of squares with only the outside edge shaded.

If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded? which is how many squares would be shaded.

If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

If you had a grid of 100 squares, how many would be shaded?

What is the rule? How do you know? Can you explain your rule? Can you give evidence?

Side length	Shaded Squares
3	8
4	12
5	16
6	20

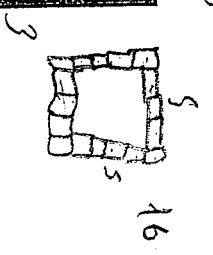
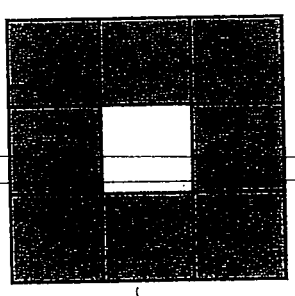
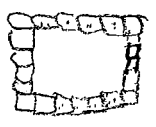
∴ as the number of sides increases by 1, the number of squares increases by 4.

$$S = 2x - 1 \times 4$$

$$(17 - 1) \times 4$$

$$16$$

(2a) Perimeter Problem



$$\begin{array}{r} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \\ 8 \\ 9 \\ 10 \\ 11 \\ 12 \\ 13 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 20 \end{array}$$

This is a 3x3 grid of squares with only the outside edge shaded.

If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?

If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

If you had a grid of 100 squares, how many would be shaded?

What is the rule? How do you know? Can you explain your rule? Can you give evidence?

The rule is subtract 4 from the number of sides then multiply 4, I know from my graph.

ex

$$y = (x-1) \times 4$$

$$= (11-1) \times 4$$

$$= 10 \times 4$$

$$= 40$$

∴ a 11x11 square has 40 shaded squares

$$x^2 - (x-2)^2$$

1) let x = the amount of squares by squares you want

$$x^2 - (x-2)^2 = 5^2 - (5-2)^2$$

$$= 25 - (3)^2$$

$$= 25 - 9$$

\therefore there will be 16 outer squares

$$= 16$$

2) let x = the amount of squares by squares you want

$$x^2 - (x-2)^2 = 17^2 - (17-2)^2$$

$$= 289 - (15)^2$$

$$= 289 - 225$$

$$= 64$$

\therefore there will be 64 outer squares

3) let x = the amount of squares by squares you want

$$x^2 - (x-2)^2 = 100^2 - (100-2)^2$$

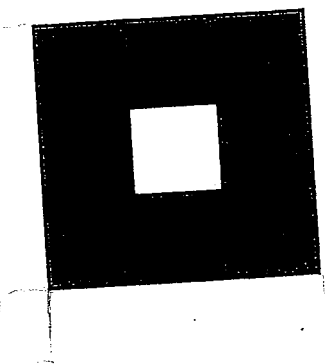
$$= 10000 - (98)^2$$

$$= 10000 - 9604$$

$$= 396$$

\therefore there will be 396 squares

(2a) Perimeter Problem



This is a 3x3 grid of squares with only the outside edge shaded.

1) If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?

2) If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

3) If you had a grid of 100 squares, how many would be shaded?

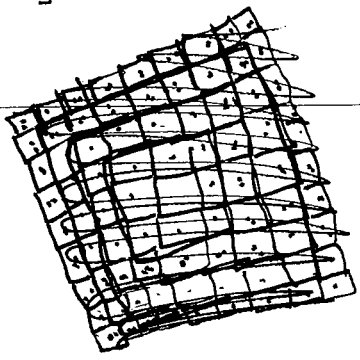
4) What is the rule? How do you know? Can you explain your rule? Can you give evidence?

4) the rule is $x^2 - (x-2)^2$.

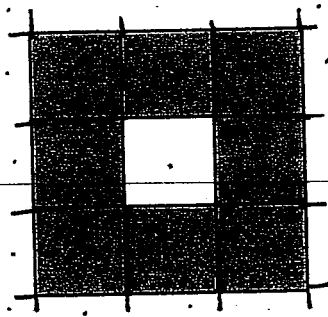
over \rightarrow

The following
samples are:

Correct



(2a) Perimeter Problem



This is a 3x3 grid of squares with only the outside edge shaded.

If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?

If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

If you had a grid of 100 squares, how many would be shaded?

What is the rule? How do you know? Can you explain your rule? Can you give evidence?

size	outer
3x3	8
5x5	16
7x7	24
9x9	32
11x11	40

5x5=16 the outer squares

are equal to the first dimension shown subtract one multiplied by four

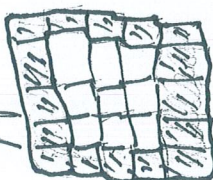
$$\begin{aligned}
 05 &= (5-1) \times 4 \\
 05 &= (100-1) \times 4 \\
 &= 99 \times 4 = 396
 \end{aligned}$$

4x4



10

5x5



16

22

(2a) Perimeter Problem

So 3x3 has 8

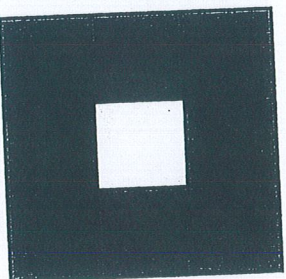
3x3

$$d(2) + (d-2)2$$

$$= 3(2) + (3-2)2$$

$$= 6 + 2$$

$$= 8$$



6x6

$$7 \times 7 = 28$$

This is a 3x3 grid of squares with only the outside edge shaded.

If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?

If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

If you had a grid of 100 squares, how many would be shaded?

What is the rule? How do you know? Can you explain your rule? Can you give evidence?

works!

The general rule I found is $d(2) + (d-2)2$

where d is the dimension of one side

dimensions

outside edges

1x1	1
2x2	4
3x3	8
4x4	12
5x5	16
6x6	20
7x7	24
8x8	28

$$\text{dimension}(2) + (\text{dimension}-2)2$$

Don't forget the correct answer for each one!

$$4(4) = 16$$

$$16 - 4 = 12$$

$$5(4) = 20$$

$$20 - 4 = 16$$

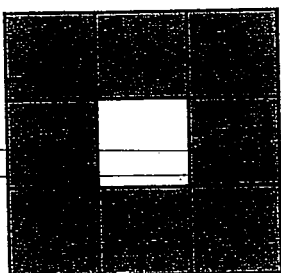
$$6(4) = 24$$

$$24 - 4 = 20$$

(2a) Perimeter Problem

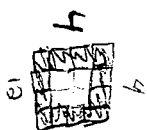


3



3

3x3	8
4x4	12
5x5	16
6x6	20



$$5 \times 5 = 16$$

$$y = 4x - 4$$

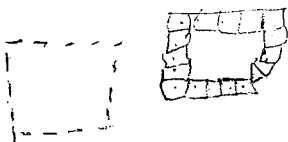
This is a 3x3 grid of squares with only the outside edge shaded.

If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?

If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

If you had a grid of 100 squares, how many would be shaded?

What is the rule? How do you know? Can you explain your rule? Can you give evidence?



3x3	8
4x4	12
5x5	16
6x6	20

The rule is $4x - 4$ because

in the graph each first difference is 4 ($4x$)

So if you times

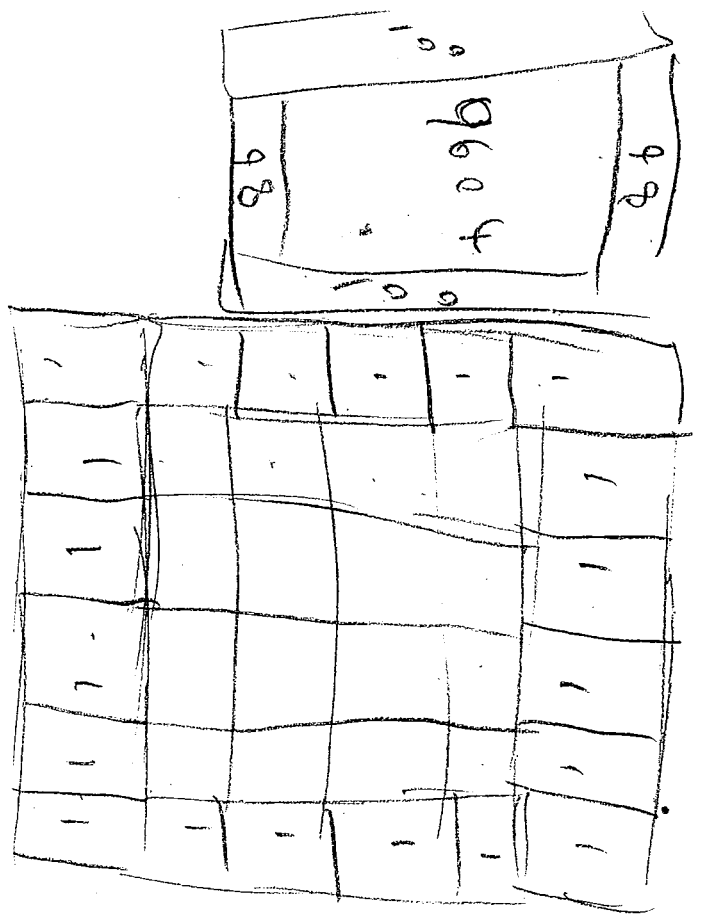
4(3) it equals

12. And you minus 4

The following
samples are:

Close – they have
elements of
correctness, but some
errors.

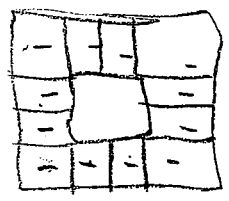
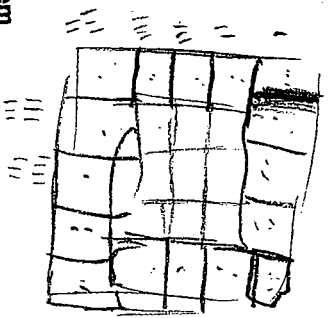
$$\begin{array}{r} 98 \\ 98 \\ \hline 196 \end{array}$$



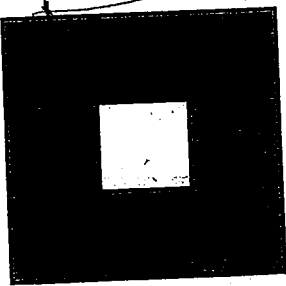
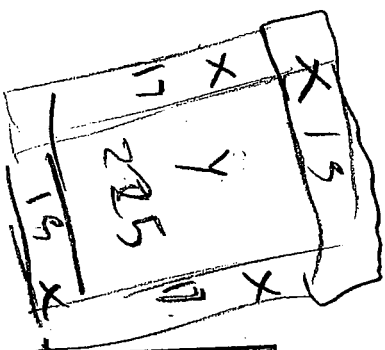
$$\begin{array}{r} 98 \\ 98 \\ \hline 196 \end{array}$$

$$\begin{array}{r} 2 \\ 17 \\ 15 \\ \hline 64 \end{array}$$

(2a) Perimeter Problem



$$\begin{array}{r} 178 \\ 4812 \\ 9716 \\ \hline 16420 \end{array}$$



This is a 3x3 grid of squares with only the outside edge shaded.

If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?

If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

If you had a grid of 100 squares, how many would be shaded?

What is the rule? How do you know? Can you explain your rule? Can you give evidence?

$x \equiv \text{length of four sides in cubes}$

$y = \# \text{ of unshaded interior cubes}$

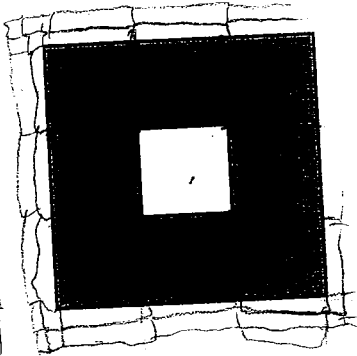
$$x - 2 = y$$

$$x4 - (x2 - 4) = 5$$

$$y \times y = 05$$

$05 = \# \text{ of unshaded cubes}$
 $5 = \# \text{ of shaded cubes}$

(2a) Perimeter Problem



$$N = (7 \times 3) + 1$$

This is a 3x3 grid of squares with only the outside edge shaded.

If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded? *there would be 16 shaded areas*

If you had a 7x7 grid of squares with only the outside edge of squares shaded, how many squares would be shaded? *there would be 52 tiles*

If you had a grid of 100 squares, how many would be shaded? *25x4*

What is the rule? How do you know? Can you explain your rule? Can you give evidence?

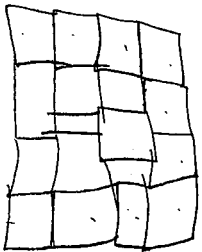
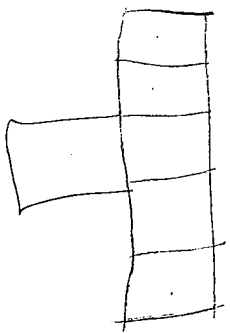
$$N = (17 \times 3) + 1$$

$$= 52$$

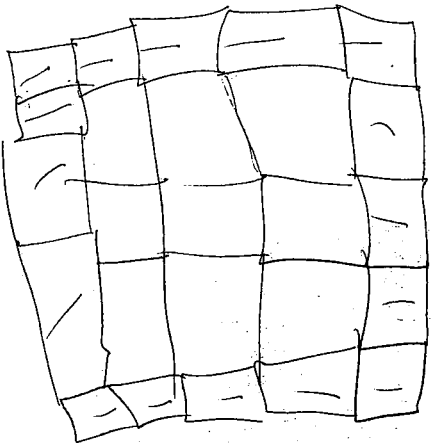
$$N = (7 \times 3) + 1$$

The following
samples are:

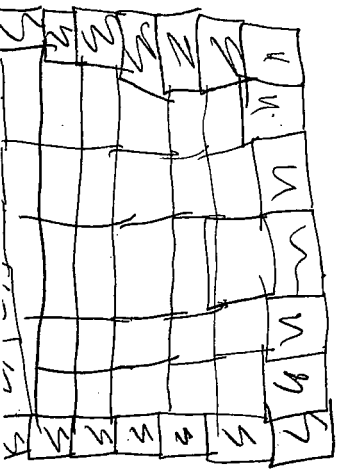
Close – they have
elements of
correctness, but some
errors.



12

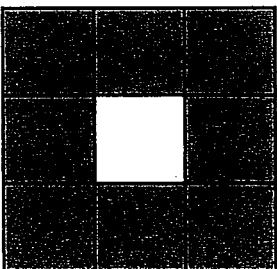


16



24

(2a) Perimeter Problem



This is a 3x3 grid of squares with only the outside edge shaded.

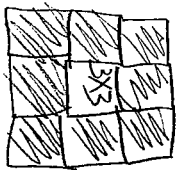
If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded? 16

If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded? 24

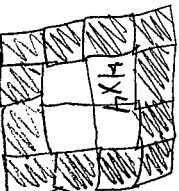
If you had a grid of 100 squares, how many would be shaded? 36

What is the rule? How do you know? Can you explain your rule? Can you give evidence?

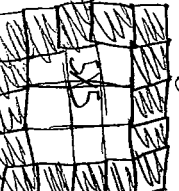
everytime you increase the squares length and width the number of shaded squares goes up by 4



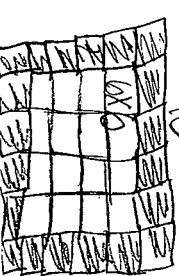
8



12



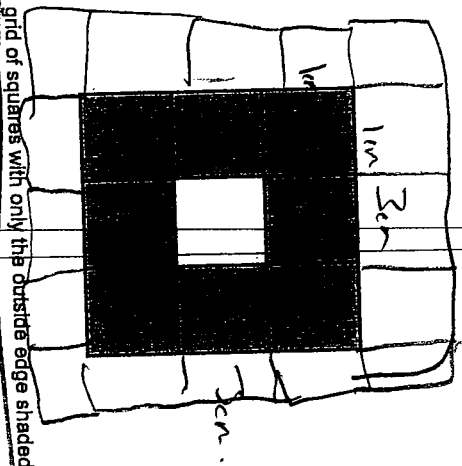
16



20

etc

(2a) Perimeter Problem

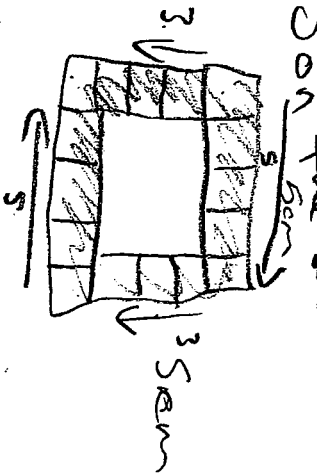


This is a 3x3 grid of squares with only the outside edge shaded.

1. If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?
2. If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?
3. If you had a grid of 100 squares, how many would be shaded?
4. What is the rule? How do you know? Can you explain your rule? Can you give evidence?

Work on
back side

1. Only 5 on the top and bottom and 3 on the sides because 2



2. 64

3. 23

4.



formula

of squares = (one of sides) (4) - 4

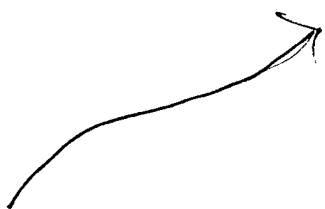
ex 17x17

$$= 17(4) - 4$$

$$= 68 - 4$$

$$= 64 \text{ number of squares}$$

Thus says
 $25 = x$
 If you had 100 squares, there would be 25 shaded.

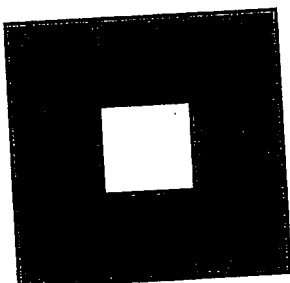


Shaded,
 $y = 4x$
 $\frac{100}{4} = \frac{4x}{4}$
 $25 = x$

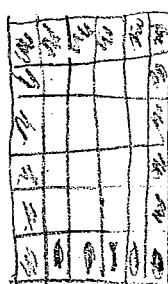
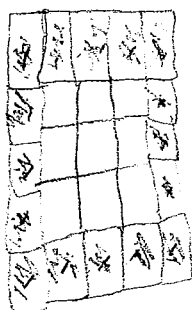
If I had a 5x5 grid 16 squares would be

$y = 4x$
 $y = 4(7)$
 $y = 28$
 \therefore there would be 28 squares shaded for a 17x17 square
 If you had 100 squares there would be 25 shaded

This is a 3x3 grid of squares with only the outside edge shaded.
 If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?
 If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?
 If you had a grid of 100 squares, how many would be shaded?
 What is the rule? How do you know? Can you explain your rule? Can you give evidence?



(2a) Perimeter Problem



of shaded squares
 $4 + 4 + 4 + 4 + 4 = 20$
 $20 + 12 + 12 + 12 + 12 = 68$
 $\therefore y = 4x$

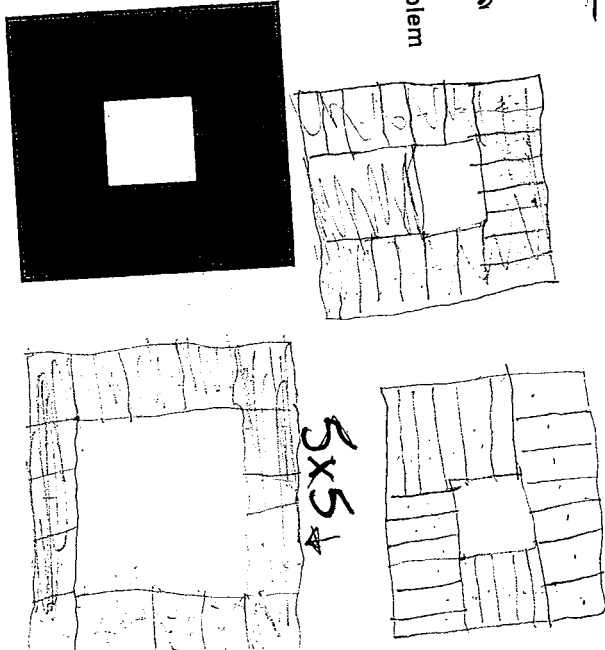
The following
samples are:

Close — they have
elements of
correctness, but some
errors.

Dimension	Shaded
3×3	8
5×5	16
7×7	24
9×9	32

7×7

(2a) Perimeter Problem



This is a 3×3 grid of squares with only the outside edge shaded.

If you had a 5×5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?

If you had a 7×7 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

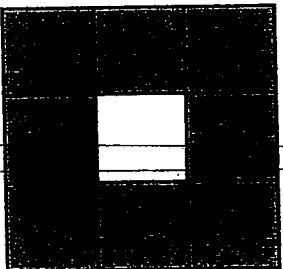
If you had a grid of 100 squares, how many would be shaded?

What is the rule? How do you know? Can you explain your rule? Can you give evidence?

You take the Dimensions and -1×4
 So $3 \times 3 - 1 = 8 \times 4 = 8$ Shaded Squares
 $5 \times 5 - 1 = 4 \times 4 = 16$ Shaded Squares
 $100 - 1 = 99 \times 4$
 $= 396$ Shaded Squares $(5n-1) \times 4$



(2a) Perimeter Problem



over

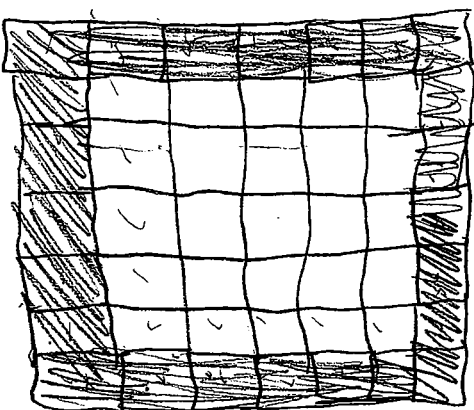
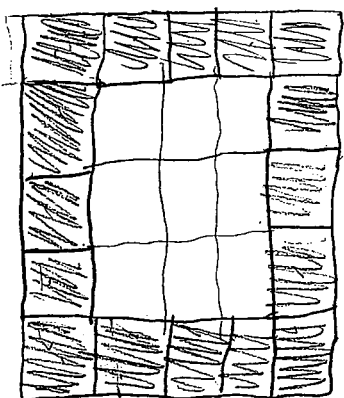
This is a 3x3 grid of squares with only the outside edge shaded.

If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?

If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

If you had a grid of 100 squares, how many would be shaded?

What is the rule? How do you know? Can you explain your rule? Can you give evidence?



For a 17x17 grid there would be 56 squares shaded.

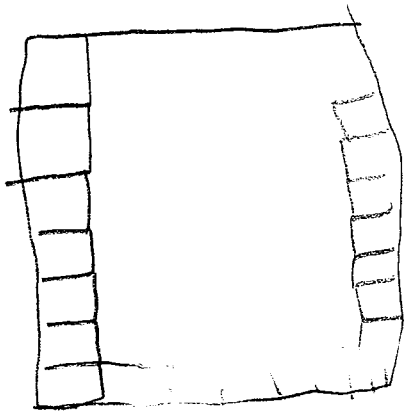
For a 100^{square} grid, there would be

# Squares	# shaded
5	8
7	16
9	24
11	32
13	40
15	48
17	56
100	

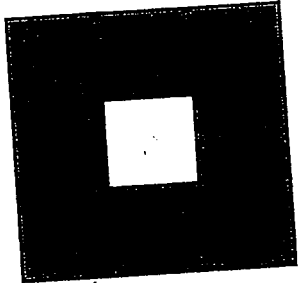
For every odd number, there is 8 more shaded squares.

The following
samples are:

Problematic— the
students either didn't
grasp the problem or
had significant
difficulty



(2a) Perimeter Problem



This is a 3x3 grid of squares with only the outside edge shaded.

If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded? **16**

If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded? **66**

If you had a grid of 100 squares, how many would be shaded? **38**

What is the rule? How do you know? Can you explain your rule? Can you give evidence? **all you do is add up the number of square on the outside**

than minus 4

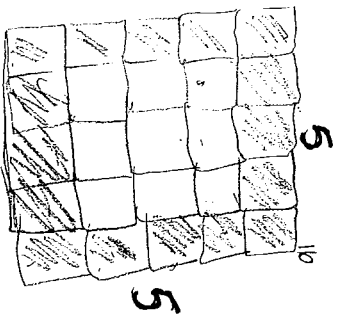
ex 5x5 grid (17+2)-4

5+5+5+5

=20-2

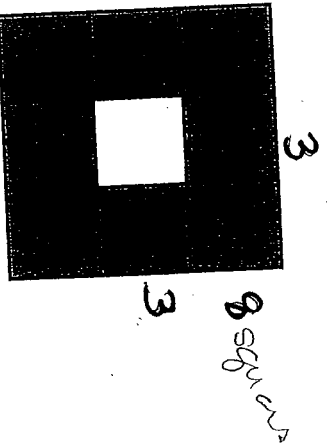
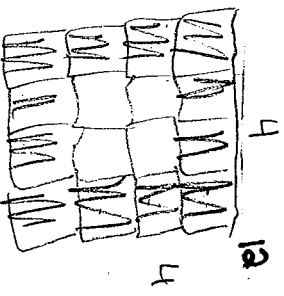
=18

• If I had a 5 by 5 square, 16 boxes would be shaded.



Outside	Squares
3x3	8
4x4	12
5x5	16
6x6	20
7x7	24

(2a) Perimeter Problem



This is a 3x3 grid of squares with only the outside edge shaded.
 If you had a 5x5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?
 If you had a 17x17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?
 If you had a grid of 100 squares, how many would be shaded?
 What is the rule? How do you know? Can you explain your rule? Can you give evidence?

The rule is:

I am confused with trying to find the equation

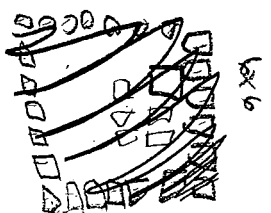
I got confused because I'm not sure what I am supposed to be looking for, at first I thought you would times than take away one

ex) $3 \times 3 = 9 - 1 = 8$

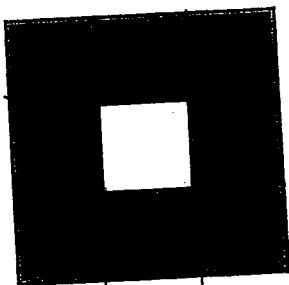
but than as I went to 6×6 I realized it did not work anymore, so I am not quite sure what to look for in the problem any more other than a pattern with the squares.

3×3	}	9
4×4		16
5×5		25
6×6		36

(2a) Perimeter Problem



try to
look
at
the
border



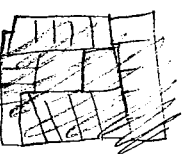
This is a 3×3 grid of squares with only the outside edge shaded. 8

If you had a 5×5 grid of squares where only the outside edge of squares is shaded, how many squares would be shaded?

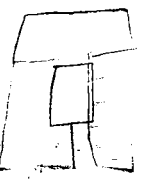
If you had a 17×17 grid of squares with only the outside edge of squares shaded, how many squares would be shaded?

If you had a grid of 100 squares, how many would be shaded?

What is the rule? How do you know? Can you explain your rule? Can you give evidence?



5×5



$3 \times 3 = 9$

$5 \times 5 = 25$

$17 \times 17 = 289$